average stature of Europe. It is to be feared this estimate, based on somewhat small numbers, is too favourable. The impression gained on returning to England after a tour in Scandinavia is scarcely that of the superiority of the English physique. The probable explanation is that the majority of the recorded observations in this country has been made in rural districts, while the actual majority of the population has been subjected to urban influences.

During the last few years a large number of measurements of children in our large towns have been made in connection with the study of school hygiene, and afford data for comparison with the series obtained in Stockholm by Axel Key, and it may be noted that at all school ages the Swedish children show a distinct superiority both in stature and weight. Indeed, the British children present averages very nearly the mean between the Swedish and Italian averages, which would agree well with the view that both Teutonic and Mediterranean races are represented among the present-day English in about equal proportions.

A final feature of great interest recorded in Dr. Deniker's work is the distinct increase in stature which has taken place during the last half-century among several of the European populations, chiefly those which have participated in the general amelioration of social conditions and improvements in hygiene without being to a great extent subjected to urbanising influences.

Further investigations into national physique are urgently needed from the economic and public health standpoint, as well as to elucidate the problems of the systematic anthropologist. It is to be hoped that in time a detailed survey of this country may be undertaken, and that the results may be available for subsequent volumes of Dr. Deniker's comprehensive and illuminating work.

ARTHUR LISTER, F.R.S.

BY the death of Mr. Arthur Lister, F.R.S., which, as announced in our issue of July 23, took place at his residence at Leytonstone, Essex, on Sunday, July 20, the science of cryptogamic botany has sustained a severe loss. The deceased gentleman, who was a J.P. for his native county, was the son of the late Mr. J. Jackson Lister, F.R.S., of Upton Essex, where he was born in the year 1830. He was a brother of Lord Lister, and in 1855 married Susanna, daughter of the late Mr. William Tindall, of East Dulwich. From an early period of his career Mr. Lister devoted himself to the study of the Mycetozoa, a group formerly classed with the funguses, but now, largely owing to his researches, allowed to rank as a group of equal value by itself, characterised specially by the peculiar mode of development of its members. In addition to numerous separate papers on the subject in the journals of various scientific societies, Mr. Lister wrote the valuable "Monograph of the Mycetozoa," published in 1894 as one of the well-known British Museum catalogues. Since the date of its appearance this thick green volume, which is illustrated by a large number of plates and text-figures in black and white, remained the standard work on the subject. By the lapse of time it had, however, as a matter of course, become out of date, and, until incapacitated by failing health, Mr. Lister, aided by his daughter, was engaged on preparing a new and enlarged edition.

The issue of this work, as we have been kindly informed by the keeper of the botanical department of the Museum, will not be stopped by the demise of the senior author, Miss Lister having undertaken the task of bringing it to completion single-handed. The new edition will be far superior to its predecessor in the matter of illustrations, these including a number of plates reproduced by the three-colour process from Miss Lister's sketches.

In addition to cataloguing the species in the Museum collection, Mr. Lister gave in the original edition of this work a valuable account of mycetozoan development and physiology. Mr. Lister joined the Linnean Society so long ago as 1873, serving on the council from 1891 to 1896, and as a vice-president during the last year of this term of office. In 1898 he was elected a Fellow of the Royal Society.

NOTES.

ON August 5, 1858—fifty years ago—the work of laying the first Transatlantic cable was completed, and telegraphic communication was established between Great Britain and America. As is well known, the cable failed to transmit after a few weeks, but the practicability of connecting the two countries electrically had been demonstrated, and the jubilee of this enterprise cannot be passed without a word of congratulation.

COUNT ZEPPELIN started in his airship from Friedrichshafen at 6.45 a.m. on August 4, and after passing over Bâle, Strassburg, and Karlsruhe, reached Mannheim at 2.40 p.m. A descent was made near Oppenheim at 6 p.m., and the journey was continued at 10.15 p.m. The airship passed over Mainz at 11.0 p.m., and then headed up the Rhine for the homeward journey, reaching Mannheim at 1.45 a.m. on August 5, Eppingen at 4 a.m., and Stuttgart at 6.20 a.m., where, according to the latest telegrams, it broke away from its moorings and caught fire during a storm, and disappeared into the air, Count Zeppelin being safe.

THE Paris correspondent of the *Times* reports that the Russian Government has offered a prize of 50,000 roubles (5000*l.*) for a flying machine competition which is to take place next year at St. Petersburg between July 1 and August 15.

THE annual meeting of the French Association for the Advancement of Science was opened at Clermont Ferrand on August 3, when the gold medal of the association was presented to Sir William Ramsay, K.C.B., F.R.S.

THE President of the Board of Trade has appointed Lord Rayleigh, P.R.S., Prof. J. J. Thomson, F.R.S., Dr. R. T. Glazebrook, F.R.S., Sir John Gavey, C.B., and Mr. A. P. Trotter to be the British delegates to the International Conference on Electrical Units and Standards which is to assemble in London on October 12. Mr. W. Duddell, F.R.S., and Mr. M. J. Collins, of the Board of Trade, will act as secretaries to the British delegates, and Mr. F. E. Smith and Mr. C. W. S. Crawley as assistant secretaries.

AT the meeting of the Royal Society of Edinburgh on Monday, July 20, Dr. R. H. Traquair, F.R.S., vice-president, in the chair, the following prizes were presented in accordance with the award of the council:—(1) the Keith prize for the biennial period 1905–7 to Dr. Alexander Bruce, for his paper entitled "Distribution of the Cells in the Intermedio-lateral Tract of the Spinal Cord," published in the Transactions of the society within the period; (2) the Neill prize for the triennial period 1904–7 to Mr. Frank J. Cole, for his paper entitled "A Monograph on the General Morphology of the Myxinoid Fishes, based on a Study of Myxine," published in the Transactions of the society, regard being also paid to Mr. Cole's other valuable contributions to the anatomy and morphology of fishes.

AT Tavistock on July 20, Colonel G. F. O. Boughey, R.E., and Mr. H. A. Steward, Light Railway Commissioners, sanctioned a line on a gauge of 4 feet 8½ inches to be constructed on Dartmoor near the famous Merrivale avenues of stones, provided that the line "be put quite 200 feet away from the Menhir." Mr. Hansford Worth, who gave evidence at the inquiry against the line, pointed out that the railway would pass through a remarkable group of prehistoric monuments, and that the embankments would interfere with the view. Mr. R. Burnard also strongly protested against the construction of the line, and read a letter from the president of the Society of Antiquaries deprecating any encroachment upon the ancient remains, which are almost unique in character. These protests, however, availed little, for the line may be brought within seventy yards of the avenues, and will in all probability lead to the destruction of the Merrivale antiquities, which are to a great extent unprotected. It is apparently too much to expect that our ancient monuments shall be protected by the State from the interference of company promoters. No doubt it is of commercial importance to convey granite from quarries easily, but this is not sufficient reason for carrying a line near ancient monuments which can never be replaced when once destroyed.

THE recently published report (Cd. 4202) of the Royal Commission on the Care and Control of the Feeble-minded will be followed by seven other volumes detailing the evidence taken by the Commission. The Commission was appointed in September, 1904. It appears from the report that the total number of mentally defective persons, including certified lunatics, in England and Wales, may be estimated to be 271,607, or 0·83 per cent. of the population. Excluding those certified, it is estimated, as a result of medical investigations, that in urban districts 12·7 per cent., and in rural areas 18·75 per cent., of the population in Poor Law institutions are "mentally defective." The Commissioners consider that from 60 per cent. to 70 per cent. of the habitual inebriates dealt with under the Inebriates Acts are mentally defective. They refer to heredity and mental defect, and sum up the effect of the evidence under three heads:—(1) That both on the grounds of fact and of theory there is the highest degree of probability that "feeble-mindedness" is usually spontaneous in origin—that is, not due to influences acting on the parent—and tends strongly to be inherited. (2) That, especially in view of the evidence concerning fertility, the prevention of mentally defective persons from becoming parents would tend largely to diminish the number of such persons in the population. (3) That the evidence for these conclusions strongly supports measures, which on other grounds are of pressing importance, for placing mentally defective persons, men and women, who are living at large and uncontrolled, in institutions where they will be employed and detained; and in this, and in other ways, kept under effectual supervision so long as may be necessary.

SURPRISE has been expressed that the provisional programme of Section A of the British Association was not published last week with the draft programmes of other sections for the meeting to be held in Dublin next month. We regret that the programme did not reach us with the others, but it has now been received, and is as follows:—The address of the president of the section, Dr. W. N. Shaw, F.R.S., will be delivered on the Thursday morning, September 3. Discussions have been arranged on (1) the isothermal layer of the atmosphere, to be opened by M. Teisserenc de Bort; (2) the theory of wave motion, to be opened by Prof. H. Lamb, F.R.S. The section will also join with Section G in a discussion on gaseous explosions. *Papers:* Sir John Moore, is our climate changing? Commander Campbell Hepworth, R.N.R., a comparison of the changes in the temperature of the waters of the North Atlantic and in the strength of the trade winds; J. T. Craig, changes of atmospheric density in storms; E. M. Wedderburn, seiches and their relation to atmospheric phenomena, also temperature conditions of Scottish lochs; G. T. Walker, seasonal variations; Prof. H. H. Turner, on the relation between intensity of light, time of exposure, and photographic action; Rev. A. L. Cortie, S.J., on the possible existence of steam in the regions of sun-spots; Prof. F. W. Dyson, the systematic motions of the stars; Sir R. S. Ball, a generalised instrument; A. P. Trotter, position of the mercury ohm in British legislation; Sir O. J. Lodge and B. Davies, on the measurement of large inductances containing iron; Prof. A. M. Worthington, a remarkable feature in the splash of a rough sphere; Prof. J. A. McClelland, secondary radiation; G. A. Hemsalech, on new methods of obtaining the spectra of flames; Sir Wm. Ramsay, K.C.B., do the radio-active gases (emanations) belong to the argon series? T. Royds, further experiments on the constitution of the electric spark; H. Stansfield, secondary effects in the echelon spectroscope; Dr. W. G. Duffield, photographs of the spectra of metals under pressure; Dr. J. A. Harker and F. P. Seaton, on the effect of pressure upon the boiling point of sulphur; Prof. F. T. Trouton, analogy between adsorption from solutions and aqueous condensation on surfaces; Dr. S. H. Burbury, on the law of equipartition of energy between correlated variables; Lieut.-Colonel Allan Cunningham, factorisation of the A.P.F. of $N=(y^n \mp 1)$; Dr. J. W. Nicholson, the self-inductance of two parallel wires; Sir R. S. Ball, physical applications of linear vector functions; Dr. E. W. Hobson, on Sir W. Hamilton's fluctuating functions; Prof. F. Purser, on the æther-stress of gravitation; Prof. A. W. Conway (title not received); Prof. E. T. Whittaker (title not received); Sir Howard Grubb, a particular form of double-image telescope, also the new spectroheliograph for the Madrid Observatory; F. J. M. Stratton, the constants of the lunar libration; Dr. J. W. Nicholson, the asymptotic expansions of Bessel functions. The reports of the various committees connected with the section will also be read.

INVERTEBRATES from the Upper Cretaceous of Need's Camp, Buffalo River, constitute the subjects of the first part of vol. vii. of the Annals of the South African Museum, Mr. W. Lang, of the British Museum, treating of the polyzoans and corals, while the sea-urchins and their allies, the brachiopods, and the bivalve molluscs are described by Mr. H. Woods, of Cambridge.

THE migrations of flat-fishes and crabs continue, according to the report for 1907, to engage the attention of the staff of the Northumberland Sea Fisheries Committee, and it appears to be established in the case of the latter that while the females travel north, the males are more or less stationary. A large portion of the report is occupied by a paper by Miss M. V. Lebour on the trematodes infesting fishes on the Northumberland coast, in the course of which several species, presumably unrecognised by previous writers, are named and described.

THE articles in the first part of vol. xci. of *Zeitschrift für wissenschaftliche Zoologie* are all devoted to the anatomy of invertebrates, and treat of subjects for the most part interesting to the specialist. Mr. R. Demoll, for instance, discusses the mouth-parts of solitary bees, while the structure of the median eye of the ostracod crustaceans forms the subject of a paper by Dr. M. Nowikoff, and Mr. Walter Döring describes the structure and development of the female reproductive organs of certain cephalopods.

A SYSTEMATIC monograph, by Dr. J. J. Tesch, of the heteropodous molluscs included in the family Atlantidæ, with a list of the species represented in the museum collection, forms the subject of an article in the first part of vol. xxx. of Notes from the Leyden Museum. The author, who states that the group has received but little attention for many years, recognises three genera, one of which is for the first time named and described, the characteristics on which these are based being drawn partly from the shell and partly from the "animal."

To the July number of the *Zoologist* Mr. S. M. Perlmann contributes a paper entitled "Is the Okapi Identical with the 'Thahash' of the Jews?" The word "thahash" has been translated "badger" and "dolphin," but both these readings are conjectural. The Talmudists, according to Mr. Perlmann, considered it, however, to be a ruminant, of a beautiful colour, with a single horn on the forehead. To a great extent, apparently on account of the presence of "a horn-like elevation at the root of the nose" in the okapi, the writer of the paper identifies it with that animal. Apart from the improbability of an exclusively equatorial animal being known to Moses (although the possibility of skins being imported from the south into Egypt may be admitted), the Talmudists' description of the "thahash" does not accord with that of the okapi, of which the males carry a pair of well-developed horns on the forehead—a fact with which Mr. Perlmann appears to be unacquainted. The slight swelling on the nose of the female can scarcely be described as horn-like.

AMONG the biological papers in the July issue of *Science Progress*, special interest attaches to one by Mr. W. A. Brend on tuberculosis in animals. After referring to the fact that recent investigations on the subject have been conducted on two lines—one into the effects produced on animals by the bovine tuberculosis bacillus, and the other by that of human tubercle—the author points out that the animals forming the subject of experiment may be arranged, according to their relative degree of susceptibility to the human disease, in the following order, commencing with those exhibiting the greatest approximation to immunity, viz. rats and mice; dogs; cats; pigs, goats, *and cattle; rabbits; and guinea-pigs, monkeys, and apes.* It will not fail to be noticed that the immunity is greatest in those brought most closely into association with man. In regard to the fact that rats and mice occupy the highest position in respect to immunity, it has to be borne in mind that although in the ordinary sense these creatures can scarcely be regarded as domesticated animals, yet in a scientific sense their association with man is extremely intimate. They inhabit, for instance, his cellars and sewers, and feed upon the infected sweepings of the streets and pavements. It would be of great interest to ascertain the degree of immunity presented by field-mice.

LITTLE by little we are learning that most of the edentulous or partially edentulous mammals possess germs or other vestiges of teeth in the earlier stages of their existence, and the importance of discoveries of this nature can scarcely be overrated, since they are alone practically sufficient to demonstrate the truth of the doctrine of evolution. The latest addition to the list of mammals with such vestiges is the pangolin group (Manidæ), the members of which are completely devoid of teeth. According to a paper by Dr. H. W. Marett Tims, published in vol. xlii., part ii., of the *Journal of Anatomy and Physiology*, the jaws of a fœtus of one of these animals were found to be provided with minute pointed outgrowths, which there is every reason to regard as vestigial tooth-germs rather than hair-follicles. Some of these structures arise from the alveolar margin of the jaw, while others grow from the outer side, and if they were hair-follicles some of the hairs would fringe the alveolar margin, and others would grow outwards into the substance of the cheek. So far as can be determined, the histological structure of these growths suggests teeth rather than hairs. Assuming them to be the former, they indicate that the formula of the vestigial dentition is $\frac{3}{13}$ or $\frac{3}{14}$, that the teeth in the middle of the series were the largest, while all were apparently of a simple peg-like type, recalling those of armadillos.

THE two recently published parts of the *Annals of Tropical Medicine and Parasitology* (vol. ii., Nos. 2 and 3) contain a number of memoirs of great interest. Drs. Kinghorn and Montgomery report on the etiology and prophylaxis of diseases caused by trypanosomes in man and domestic animals in northern Rhodesia, and discuss incidentally the vexed question of the relation of big game to tsetse-fly disease. Messrs. Salvin-Moore and Breinl, with the collaboration of Dr. Hindle, continue their investigations upon the life-history of trypanosomes, and deal with that of *Trypanosoma lewisi*, the parasite of the common rat. A brief but pithy memoir by Dr. E. H. Ross deals with the prevention of dengue fever, by destruction of mosquitoes, in Egypt.

AMONGST parasitic protozoa, the genus commonly named Piroplasma, but more correctly Babesia, is one which has attracted great attention by its pathogenic properties, and has also given rise to much discussion concerning its systematic position, more especially as regards its relationship on the one hand to the Hæmosporidia, on the other hand to the Flagellata. Major Christophers, in his recent monograph on the development of Piroplasma in the tick, was unable to find any flagellated stages. Miyajima, however, announced (*Philippine Journal of Science*, ii., 2) that he had obtained true trypanosome-forms in a culture of a bovine Piroplasma. Drs. Breinl and Hindle state that in dogs infected with *P. canis* they have found biflagellate forms in small numbers in the peripheral blood of dogs on the day before death (Ann. Trop. Med. Parasitol., ii., 3). Their results appear to confirm the *views of Laveran and Mesnil as to the affinities of Piroplasma* with the genus Leishmania, the parasite of kala azar.

A SECOND portion of the "Flora of Glamorgan," dealing with the Calycifloræ, has been issued under the editorship of Dr. A. H. Trow. Besides providing a full list of localities and the Welsh names, the critical notes appended by the editor add to the interest of the work, and suggest points that require further confirmation. It is noted that *Medicago sativa* and *Melilotus arvensis* can flourish on the sterile red marl, and *Onobrychis viciaefolia* thrives on the marl, but dies off in the second year on the Lias. The gean is regarded as native to the county, but the claims of the bullace and the dwarf cherry are considered more dubious. The flora is being published as a supplement to the Transactions of the Cardiff Naturalists' Society.

As in forest management we have much to learn from our Continental neighbours, it is well to ascertain the practice adopted in those countries. Mr. J. F. Annand contributes to the Transactions of the Scottish Arboricultural Society (vol. xxi., part ii.) his impressions of forestry in the Schwarzwald, observed during a course of training in the province of Baden. The silver fir generally provides the main crop, except at the higher altitudes, when spruce is the prevailing species. A small proportion of beech is found useful, but is carefully restricted. It is interesting to compare the observations recorded by Mr. Annand with the notes on the cultivation of hardwoods offered by Mr. J. Boyd. The latter, although he recommends growing coniferous and hardwood forests on separate areas, recognises that successful results can also be obtained with a mixture of both classes.

A NOTE in the *Trinidad Bulletin* (April) directs attention to the fact that the tree *Spathelia simplex*, belonging to the order Rutaceæ, is similar to the Agaves in so far as the plant grows for several years before it flowers, and then exhausts itself in the flowering and dies. A specimen that recently flowered belonged to the second generation, since the tree was introduced twenty-two years previously. In the same number will be found a detailed description of the pollination of the papilionaceous flower *Clitoria arborescens* that points to its being a complex process. Put shortly, the pollen from the stamens falls or is brushed by hairs on the stigma into a carinal pouch; the movement of bees and wasps searching for nectar causes the shedding of the pollen on to the vexillum; thence it is transferred by ants or other insects to the stigma. The flowers are inverted, and it has been demonstrated that they are self-sterile.

THE enormous advantages gained by the introduction of rapid methods for fat determination in milk has led E. B. Hart to describe in a special Bulletin (No. 156 of the University of Wisconsin) a rapid method for estimating casein in milk. The milk is mixed with chloroform to dissolve the fat, and dilute acetic acid to coagulate the casein; it is then rapidly rotated in an apparatus not unlike that used in the ordinary Gerber test, and the percentage of casein directly read off by measuring the space occupied by the clot. The trial analyses are very satisfactory, the results agreeing well with those obtained by the official method; if further work shows that the method is trustworthy, it will prove very useful to dairy chemists.

FOLLOWING up his past work on the haustorium of *Santalum album*, Mr. C. A. Barber, in No. 4 of the Memoirs of the Department of Agriculture in India, describes in detail the parasitism of *Olax scandens*. This plant is a sprawling shrub growing in the midst of thickets, thorny, with whitish sweet-scented flowers, and occurs all along the east coast of the Madras Presidency and for a considerable distance inland, chiefly at low elevations. It develops at first like an ordinary non-parasitic plant, and is capable of living for a long period on the nutriment stored in its endosperm, and, later, in its swollen stem and tap-root. There is a well-developed root system with abundant root-hairs even in old plants, and this fact, coupled with the comparative rarity of haustoria in the earlier stages of growth, suggests that the parasitism is in a somewhat elementary stage. The memoir is very well illustrated.

IN connection with an account of the observation of local earthquakes at Mt. Tsukuba in 1905 (Publications of the Japanese Earthquake Investigation Committee, No. 22 A), Prof. Omori discusses the least limit of motion which is sensible, and finds that the lower limit was a double amplitude, or range of motion, of 0·013 mm. for earthquakes unaccompanied by sound; where the earthquake was accompanied by sound, and the vibration probably more rapid, this limit fell to below 0·01 mm. In an earlier investigation of artificial vibration he had determined the minimum acceleration, which was sensible as 17 mm. per sec. per sec. These quantities give a numerical value of the feeblest earthquake which is ordinarily sensible to human beings favourably situated for noting the shock.

IN the Bulletin of the Japanese Earthquake Investigation Committee, vol. ii., No. 1, Prof. Omori deals with the annual variation in the frequency of earthquakes at Tokio and Kioto. Of the eighteen destructive and semi-destructive earthquakes which have been recorded at Tokio, seven occurred in summer and five in winter, but only three each in winter and spring; small earthquakes, on the other hand, are most frequent in winter and spring, and least frequent in summer and autumn. At Kioto the greatest frequency of small earthquakes is in March, the minimum in September; of great earthquakes, the maximum frequency is in August and the minimum from February to April, no destructive earthquakes having been recorded in these months. It will be seen that, as regards great and small earthquakes respectively, the frequency at Kioto is the reverse of that at Tokio, but in each case the frequency of one class of earthquakes is greatest when that of the other is least. The author has found that the same relation holds good for the earthquakes of Japan as a whole, and for the submarine earthquakes off the coast of Japan.

THE Geological Survey of Canada has issued a bulletin (No. 979) containing a report by Mr. R. G. McConnell on work done in the Klondike during the past season. The object in view was to estimate the recoverable values remaining in the high-level gravels along Bonanza and Hunker creeks, and in a portion of the Klondike valley, and also to obtain as much information as possible in regard to the values remaining in the low-level or creek gravels. The author estimates that gold to the value of 18,950,000*l*. has been produced in the past, and that the value of the recoverable gold remaining is 10,728,524*l*. While it is unlikely that any large area of rich gravel has escaped detection, minor discoveries may be expected so long as mining lasts, and on this account any estimate is apt to be somewhat under rather than over the mark. The report is accompanied by a large coloured contoured map of the auriferous gravels on Bonanza and Hunker creeks on a scale of 40 chains to the inch. In another bulletin (No. 992) issued by the Survey, Mr. W. H. Collins gives a report on a portion of north-western Ontario traversed by the National Transcontinental Railway between Lake Nipigon and Sturgeon Lake. All the rocks of the territory explored are pre-Cambrian and almost wholly crystalline. The Keewatin green schists are the most interesting series in that they are gold and iron bearing. Gold is mined on Sturgeon Lake, and very promising iron-ore deposits have been opened up near Lake Nipigon. The report is accompanied by a large coloured geological map of the district on a scale of 4 miles to the inch.

MR. A. J. PHILIP contributes to the July number of the *Reliquary* a useful article on the dene-holes of Kent and

Sussex. The name usually given to these remarkable structures probably connects them in popular tradition with the Danes. The writer reviews the many theories which have been advanced to account for their origin—that they were flint-workings; places of secret worship and repositories for the remains of the dead; underground dwellings or hiding-places; excavations for the extraction of chalk. All these are found to be inadequate. The amount of flint which could have been obtained in such places is insignificant, and no attempt seems to have been made to work the small existing supplies; there is no evidence that they served any purpose in connection with a religious cultus; the existence of many excavations within a limited area renders it improbable that they were dwelling-places or refuges, their contiguity exposing them to simultaneous hostile attack, while their construction offers no facilities for escape; their character shows that the removal of chalk was not the primary intention. Mr. Philip favours the supposition that they were intended to be used as silos, or underground granaries, and most of the arguments adduced in opposition to the other theories contribute to establish this view. Thus they were naturally close together, because the tribe clustered within a narrow area. The principal objection is the risk of damp; but, as a matter of fact, the caves seldom show signs of being affected by underground moisture, and perishable grain was probably protected by thick surrounding layers of straw. That they were not the work of a single age is shown by the fact that the character of the pick-marks varies; in the older specimens we find marks of horn, bone, and flint tools; in those of a later date metal implements were used. The shaft is invariably some 3 feet in diameter, and seldom less than 60 feet in depth, ingress and egress being provided by means of a rude ladder or by ropes of hide.

THE Deutsche Seewarte has recently published a double number (Heft 15 and 16) of its collection of over-sea meteorological observations, referring chiefly to the years 1905–6. The work includes (1) monthly and yearly means of eye observations and automatic records made under the supervision of the Seewarte at twenty-five stations; (2) individual observations and hourly means at a number of selected stations in German East Africa. The whole of the tables give evidence of great care in their preparation for publication, to the cost of which the Imperial Colonial Office contributes; they furnish a very valuable contribution to the meteorology of various remote parts of the globe. We are glad to note that, in cases where only summaries are printed, the original documents are available on loan for the purpose of scientific investigations under reasonable restrictions as to their safe return.

FIVE years ago M. Ivar Fredholm published in the *Acta Mathematica* a remarkable memoir which seems likely to prove the starting point of a host of important results, both in function-theory and in mathematical physics. One of the latest works to which it has given rise is the thesis of Dr. H. Bryon Heywood, "Sur l'Équation fonctionelle de Fredholm et quelques-unes de ses Applications" (Gauthier-Villars, 1908). In this the author gives a summary of the results of Fredholm, Picard, Poincaré, and others, and gives applications to heat-conduction, tides, potential, &c. The first chapter contains an extension of some propositions of Hilbert's; this appears to be the most original part of the thesis, but the whole is worth reading, because it brings a variety of problems under the same treatment.

THE *Physical Review* for June contains a communication from Messrs. A. H. Taylor and E. H. Williams, of the University of Wisconsin, on the distributed capacity of resistance boxes. They find by the modified bridge method used by Messrs. Rosa and Grover for comparing inductances, that the capacity of the ordinary Wolff 1000-ohm coil is 0·0005–0·0006 microfarad, while that of a 1000-ohm coil wound on a wood core is only 0·00007 microfarad. Wolff 500-ohm coils give 0·00016–0·00022 microfarad, and 2000-ohm coils 0·00041–0·00063 microfarad. The authors attribute the high capacities of Wolff coils mainly to the comparatively large wire used in constructing them, but also to the shellac between the wire and the brass tube on which it is wound not being thoroughly dry. It seems evident from these results that resistance coils must be used with great discrimination in accurate alternating current measurements.

IN May last M. C. Féry gave before the Société française de Physique an account of the methods he had in succession adopted, in his endeavour to produce a pendulum electrically driven, which should be accurate to within a second a day. His communication is printed in full in the July number of the *Journal de Physique*, and from it we gather that the arrangement he finds most satisfactory is one in which the pendulum carries beneath the bob a horse-shoe magnet, the plane of which coincides with the plane of swing of the pendulum. The lower of the limbs of the magnet enters during its swing a fixed coil, and the upper a small copper ring which forms the bob of a second pendulum having the same time of swing as the first. This ring is carried along with the moving magnet owing to the currents induced in it, and makes or breaks the circuit of the fixed coil, through which a current from a cell in series with it flows in consequence in such a direction as to supply the small impulse necessary to compensate for the decay of swing of the principal pendulum owing to friction. The same arrangement is adopted by M. Féry in controlling a number of distant pendulums by means of a central standard.

WHEN sufficiently fine solid particles are suspended in a liquid they exhibit under a high-power microscope rapid motions which are known, from their discoverer, as "Brownian." These movements form the subject of an interesting study by Dr. M. Seddig in the *Physikalische Zeitschrift* for July 15. The particles were of cinnabar, a quantity of which was stirred up with the liquid and allowed to stand in a long tube for a week. The top layer of liquid was then decanted, and a drop of it arranged as a slide in a microscope fitted with a camera. An arc light provided the strong illumination necessary. By means of a falling shutter with two holes in it, two exposures, each of 1/40 second and 1/10 second apart, were made, and the motions of a number of the particles between the two exposures measured on enlargements of the original plates. As the result of observations made on the same liquid at different temperatures, Dr. Seddig comes to the conclusion that the theory of these movements given by Einstein, according to which they should vary in intensity as the square root of the absolute temperature, is in keeping with the facts.

DR. F. A. BATHER proposes to publish a double index to the generic and specific names in E. Desor's "Synopsis des Échinides Fossiles," a work still in constant use by every worker on the Echinoidea. This index will be preceded by a "Note sur les Dates de Publication," drawn up by Mr. Jules Lambert. Intending subscribers to the index should communicate with Dr. Bather at the Natural History Museum, South Kensington, S.W.